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Date of Application, 27th Feb., 1901—Accepted, 27th Feb., 1902

COMPLETE SPECIFICATION.

“Improvements in Printing and Issuing Tickets and the like and for Indicating, Registering and Recording Certain Particulars in connection therewith.”

I, WILFRED IGNATIUS OIIMER, of Main Street, Dayton, in the State of Ohio, one of the United States of America, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

5 This invention relates to machines for printing and issuing tickets and the like for journeys on road-cars, railways, steamboats or other conveyances, for admission to theatres and other places of entertainment and for enclosures or enclosed places generally, for printing and issuing tradesmen's bills for goods
 10 services where tickets or similar checks are employed

According to my invention, tickets, bills or similar checks of various denominations may be readily furnished, each bearing an indication of the amount paid, and, in the case of a passenger conveyance, the place from which and to
 15 which in the 'run' of the vehicle the fare paid applies, or in the case of a purchase of goods, particulars as to the nature and cost of the article purchased, the date and time of issue, the serial number and any other particulars that may be required. The machine may be arranged for storing a duplicate ticket, bill
 20 or other check; also for indicating the serial number of the ticket as well as the amount of the fare or purchase; and, further, the machine may be arranged to prohibit the issue of a ticket until the fare- or purchase-indicator has been returned to zero.

For the purpose of describing the mode of carrying my invention into effect, I will assume, by way of example, that the machine is constructed for use on a road-car.

25 In the accompanying drawings, Fig. 1 is a perspective view of the exterior of a machine furnished with means for issuing tickets of two distinct denominations according to my invention. Fig. 2 is a similar view of a machine furnished with means for issuing tickets in accordance with my invention and whereby, in addition to the date and other particulars, the time of issue is also
 30 indicated upon the ticket and a duplicate of the latter retained in the machine. Figs. 3 to 8 inclusive are various views illustrating the operating mechanism of the device shown in Fig. 1; Fig. 3 being a side elevation with the casing removed, Fig. 4 a front elevation with the casing indicated in dotted lines, Fig. 5 a side elevation of the opposite side shown in Fig. 3, Fig. 6 a vertical
 35 section on the line $x-x$ in Fig. 4, looking in the direction of the arrow, Fig. 7 a plan corresponding with Fig. 6 and Fig. 8 a rear view corresponding with Fig. 4. Fig. 9 is a plan of the electrotype or plate bearing the permanent portion of the matter to be impressed upon the ticket, Fig. 10 being a portion of the ticket strip detached and having the various particulars printed thereon.
 40 Fig. 11 is a view illustrating an alternative form of trip for use in the tracks which guide the printing roller during the inking and printing operation. Figs. 12 and 13 are enlarged detail views in section and plan respectively showing printing mechanism comprising means for printing the time as well as other particulars; Fig. 14 being a plan looking in the direction of the arrow in

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Fig. 12. Fig. 15 is a section taken on the line $y-y$ in Fig. 16, looking in the direction of the arrow. Fig. 16 is a rear elevation of Fig. 15, the door at the back of the casing being removed. Fig. 17 is a front elevation and Fig. 18 a side elevation of one of the sets of mechanism shown in position in the rear view, Fig. 16. Fig. 19 is a detached view of the mechanism whereby the fare indicator is returned to zero before the machine can be operated for the issue of a ticket. Figs. 20 to 24 inclusive are detached views illustrating various methods whereby the number indicated by the counting mechanism may be printed upon the ticket. Figs. 25 and 26 are respectively an end view and a plan of an alternative means of setting the station printing rollers. Fig. 27 is a view of a ticket having the station indicators arranged side by side and the serial number printed thereon. Fig. 28 is a fragmentary view of the interior of a street car illustrating a mode of applying my improved ticket issuing mechanism thereto; Fig. 29 being a detached view of the means employed in operating the mechanism pertaining to the several fares.

The machine comprises a shell or casing A enclosing one or more sets of ticket printing and registering mechanism each held between two side plates B and separated from each other as shown in the drawings. On the interior of each plate B is secured, or otherwise formed, the grooves or channels C and C¹ (see Fig. 6) wherein the extremities of the spindle d pertaining to the printing roller D work, the latter being supported in a pair of swinging bars E. The lower end of each of these bars E is pivotally mounted upon studs e which project through slots b and into sliding racks $b^1 b^2$ mounted in guides b^3 on the outside of each of the plates B (see Figs. 3 and 5). The spindle d whereon the roller D is mounted, projects beyond the outer face of the side bars E and engages in the grooves C and C¹ at the time that the printing roller D is operating to press the paper strip F supplied from the roll F¹ into contact with the printing characters, hereinafter described. As the racks b^1, b^2 move in their guides b^3 , the bars E are correspondingly moved, the racks being on the outside of the plates B, while the bars E are on the inside. This causes the roller D by means of the extremities of the spindle d to travel up the channels or grooves C at the top of which the spindle d encounters a spring controlled trip device C² the object whereof is to permit the ends of the spindle d to enter the grooves C¹. As soon as this is effected the trip device is returned to the position shown in the drawing (Fig. 6) by means of the spring c . A shoulder c^1 on each trip device C² serves to prevent the spindle d returning along the groove C when the movement of the rack bars is reversed, as will hereinafter appear. Consequently, the ends of the spindle d travel back in the groove C¹ thus preserving the printing roller from contact with the printing characters during the return movement. Between the bars E E is mounted a frame G formed with a housing g for an inking roller G¹. One or both of the arms of the frame G is or are furnished with a stud g^1 which engages with the bar or bars E and prevents the inking roller from further descending. A coiled spring g^2 serves to normally hold the frame G in such a position that the studs g^1 engage with the bars E, and also to retain the inking roller against the printing characters, while the printing roller D travels up the inclined groove C. As the printing roller follows the course of the groove C¹, the inking roller is moved away from the printing characters owing to the pins g^1 remaining in contact with the arms E. Thus, on the return movement of the printing roller D, the inking roller is caused to remain out of contact with the printing characters until the printing roller is again moved into printing position.

The mechanism for operating the printing characters which are inked by the rollers G¹ and which are also impressed upon the paper which constitutes the ticket comprise an electrotype H arranged substantially parallel with the grooves C C¹ and secured to the side plates B in any suitable manner. This electrotype which carries the characters comprising the permanent portion of the ticket is provided with holes or openings H¹ H² H³ for admitting to the print-

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ing plane certain matter carried by the rollers or cylinders I, K, L. The rollers I and K are mounted on shafts I¹ and K¹, respectively, and are adapted to carry any printing characters which may be desired such as, for instance, the names of stations, or an indicator for such stations as the letter "A," "B," "C," "D," etc. Between the printing cylinders I, K, is preferably mounted a shaft L¹ upon which is carried the printing wheel L, bearing the abbreviations of the months of the year, as also wheels bearing numerals from 0 to 9 inclusive, respectively, that is, there is one wheel L for the names of the months, one wheel *l* for the units of the months and one wheel *l*¹ for the tens of the months.

10 Near the shaft L¹ is also mounted a pair of shafts L² and L³. The shafts L¹ L² L³ extend through the several sets of mechanism; the shaft L¹ being provided with a knurled head L⁰ whereby each set of month printing characters are simultaneously turned or set into the position for printing in the opening H² of the electrotype H. The shaft L² carries a gear wheel *l*² and the shaft L³ carries

15 a gear wheel *l*³, the said gear wheels respectively meshing with the gear wheels *l*⁰ and *l*¹ pertaining respectively to the units and tens printing wheels *l* *l*¹. Both the shafts L² L³ project through the casing and are provided with knurled heads L^{2x} L^{3x}, respectively whereby the several units and tens date-printing wheels may be simultaneously set in the required position for printing the date of the month.

20 Each month printing wheel L, as also each of the units and tens printing wheels *l* *l*¹, are provided with ratchet wheels, with which engage dogs L⁴, L⁵, L⁶, respectively, which are held in position by springs *l*⁴, *l*⁵. In the same manner the printing cylinders I and K are held in printing position by detents *i*, *k* which engage with ratchet or stop wheels *i*¹, *k*¹ at one end of each of the

25 cylinders. The detents *i*, *k* are held in engagement with the respective ratchets *i*¹, *k*¹ by springs *i*² *k*², there being one spring for each detent.

Referring again to the guide or groove C¹, constituting a track for the printing roller D, it will be observed that in one side of such groove is mounted a trip device C³, one end of which normally closes the groove and is held in such

30 position by means of a spring *c*². As the inking roller travels to the inner end of the groove C¹, it causes the switch-C³ to swing out of its path, but so soon as it passes into the inner or lower end of the groove C, the switch closes the passage C¹ and prevents the return of the printing roller into such groove, while permitting the inking and the printing roller to pass up along the groove C for

35 the purpose of inking the printing characters and effecting the printing of the paper strip in a manner hereinafter appearing. In the present instance the electrolyte H (Figs. 6 and 7) bears the printing characters representing "from," "A569" (the identifying mark on the machine), "fare," "to," together with the amount of the fare, such amount varying in each set of mechanism according

40 to the number of fares to be charged. Any suitable additional matter such as the name of the proprietors, advertisements, etc., may be embodied for production on the ticket; while between the word "from" and the characters "A569" the letter "A" appears, such letter being formed upon the printing cylinder I; while, between the word "to" and the amount of the fare, the letter "B"

45 appears. Thus, upon the paper roll or strip will appear the words "from A to B", meaning that the ticket is good for travel from station "A" to station "B" for a definite amount of fare, say one unit.

Modified forms of trip pieces in connection with the tracks C C¹ are shown in Fig. 11, but in view of the above description detailed explanation thereof is

50 unnecessary.

I will now describe the manner in which the inking and printing rollers are operated through their connection with the racks *b*¹. By referring to Figs. 3 and 5, it will be observed that gear wheels D¹ and D², both of which are fixed on the shaft D³, extending through the side plates, mesh with the racks *b*¹ and *b*², respectively. Upon this same shaft is also mounted a gear wheel D⁴, which is formed with, or otherwise secured to, the gear wheel D¹. With the gear wheel D⁴ meshes a toothed segment D⁵ of a hand lever D⁶. Consequently,

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as the hand lever D^6 is operated about its pivot D^7 , the racks b^1 and b^2 , by meshing with the gear wheels D^1 and D^2 , respectively, are moved lineally in their guides b^3 . Inasmuch as the side bars E are secured to the respective sliding-racks b^1 and b^2 , and also rigidly connected with each other, both side bars, as also the inking and printing rollers, operate at the same time, and, consequently, since the side bars operate together, the pressure throughout the length of the inking roller, as also the printing roller, is equal, so that all of the type is properly inked and the impressions are clear and even. Let it be supposed that the rack bar b^2 is slid from the position indicated in Fig. 3 to the opposite end of its guides. This will cause the gear wheel M engaging therewith to rotate in one direction. Such gear carries a pawl or detent m^1 , and adjacent thereto, upon the same stud m , is mounted another gear wheel, substantially the same size, indicated at M^0 . This latter gear wheel carries a ratchet wheel M^1 ; a spring m^2 normally causing the detent to engage therewith. Consequently, as the hand lever D^6 has been moved in one direction, the direction shown by the arrow in Fig. 3, the gear wheel M will rotate while the gear wheel M^0 will remain stationary. The gear wheel M^0 meshes with a driven gear wheel m^3 carried at one end of a roller shaft m^4 , upon which is mounted a roller M^2 (see Fig. 4). The driven gear wheel m^3 also meshes with a driven gear wheel m^5 on the end of a shaft m^6 , which also carries a toothed roller M^3 . During the return movement of the hand lever, the wheels M and M^0 are engaged and thus cause the rotation of the rollers M^2 M^3 . The roller M^2 is preferably formed of rubber, or other suitable elastic material, while the roller M^3 is formed of metal, bearing teeth which press tightly into contact with the rubber roller.

Referring now to the paper upon which the ticket is printed, and the manner in which it is pressed against the printing characters and issued from the machine, it will be observed that between the plates B is pivotally mounted a spool F^0 which carries a paper roll F^1 thereon. One end of this paper roll passes around a roller f (see Fig. 6) and between the inking roller housing g and the impression roller D , emerging between the rollers M^2 and M^3 , which constitute feed rollers for drawing the paper strip through the machine and also for holding the paper strip so that the ticket, as it passes out through the openings F^2 , F^{2x} , may be detached from the remainder of the strip and handed to a passenger. As the portion of paper printed is issued from the machine, it becomes indented by the roller M^3 and it is believed that this mode of drawing out and indenting the ticket insures the printing from becoming blurred. It will be obvious that the inking of the printing characters by the roller G^1 immediately precedes the printing or impressing by the roller D of the paper strip F upon the printing characters; it being understood that the roller D follows the course of the groove C . Thus there is a roller which inks the type, and a roller or cylinder which presses the paper strip into engagement with the printing characters during one single operation, and, inasmuch as the impressing and inking rollers press evenly on the type and paper, respectively, a clear impression on the ticket results.

In connection with the mechanism for indicating that a fare has been paid, and for indicating to the conductor and passengers the number of fares which have been paid, it will be observed that, upon the rack bar b^2 is mounted a stud or pin b^4 which normally stands in the path of a detent b^5 , pivoted upon a crank arm b^6 , keyed, or otherwise secured, to a shaft b^7 mounted in bearings in the guideways b^3 , one at each side of each set of mechanism. On the opposite side of the machine, and also secured to said shaft b^7 , is mounted a bell clapper or striker b^8 (see Fig. 5). A pin or stop b^9 is carried by the crank arm b^6 and serves to prevent the detent b^5 from swinging about its pivot in one direction, while permitting it to freely turn in the opposite direction. A spring b^{10} , one end of which is secured to the crank arm b^6 , while its other end is secured to the detent b^5 , acts to normally hold the detent against the pin or stop b^9 . As the hand lever D^6 is operated, and the rack bar b^2 is slid along in its guides, the pin b^4

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comes into contact with the detent b^5 which, in one direction, it allows to pass without elevating the crank arm b^6 , while in the opposite direction, or when the hand lever is thrown down from the position indicated in Fig. 1, the pin b^4 operates to raise the detent b^5 , and also the crank arm b^6 . This partially rotates the shaft b^7 whereupon the bell clapper b^8 is operated and the bell b^{11} rung, the latter being common to all the sets of mechanism. A spring b^{12} about the shaft b^7 , one end of which is secured to the shaft by means of a binding screw b^{13} and a collar b^{14} , while its other end is secured to one of the side plates B, acts to normally hold the crank arm b^6 , as also the bell clapper or striker b^8 , in engagement with the respective pins b^{6x} and b^{8x} in the guides b^3 , one on one side of one set and one on the other side of the same set of mechanism. As the shaft b^7 extends across all the sets of mechanism, whichever set may be operated, the shaft b^7 will be partially rotated and the clapper b^8 caused to strike the bell; indication being thereby made that a ticket has been registered by registering mechanism herein-
 5 after described.

A plate N bearing a numeral which indicates the amount of fare is pivotally mounted in front of each set of mechanism, a spring n serving to hold the plate in the position in which the numeral thereon is normally removed from the respective sight opening N^1 in the casing A. When, by way of illustration, a
 20 ticket corresponding with a two unit fare is to be issued, the two fare indicator will be operated so as to bring the numeral "2" on the plate N opposite the opening N^1 . This is accomplished by means of a lever n^1 , one end of which is pivoted at n^2 , while the other end engages with a projection N^0 on the plate N. As the rack bar b^2 is moved in the direction to ring the bell, the pin b^{4x} thereon
 25 by engaging the lever n^1 causes the latter to throw the indicator into indicating position; a catch n^3 , on the shaft n^4 , thereupon engaging with the arm N^0 of the indicator and holding the latter in such position. The withdrawal of the catch n^3 from engagement with the arm N^0 is effected by the coiled spring n^5 , in conjunction with the link n^6 , whereof one end is connected with the clapper b^8
 30 on the shaft b^7 , while the other end is secured to a crank n^7 on the shaft n^4 . The instant this takes place the spring n operates to return the indicator to the normal position.

At the same time that the bell is sounded, the shaft b^7 , which extends through each set of mechanism comprised in the casing A, is partially rocked and causes
 35 the bar n^6 on the respective crank n^7 in the set which is operated, to act upon its crank, the indicator last exhibited being thrown out of view. Consequently no number will be exhibited in any of the sight openings N^1 . By continuing the movement of the operating lever D^6 in the same direction in which it is being moved to ring the bell, the indicator in the set being operated will be thrown
 40 into indicating position, in the manner above described. This occurs at the time the ticket is being issued from the machine, so that the amount of the fare which appears on the ticket is also indicated through the sight opening.

Referring to the registering mechanism for indicating the number of fares which have been paid by any set of mechanism, the shaft D^7 pertaining to the
 45 operating lever D^6 has secured thereon a crank arm O adapted to engage a bifurcated arm O^1 , secured to the shaft of an ordinary counting apparatus is indicated at O^2 ; the counter being mounted upon a bracket o , screwed or otherwise secured to the side plates B. As the operating lever is thrown in one direction, the bifurcated arm O^1 is correspondingly moved, while on the return movement of
 50 the former the latter is thrown in the opposite direction. Consequently, the shaft of the counter is rocked back and forth, so that the counter is operated in a manner well known.

From the above description it will be understood that, with this invention, the printing characters are inked by the inking roller, while the printing roller
 55 or cylinder presses a strip of paper upon the said characters thereby impressing the latter upon the strip of paper, while at the same time the number of fares, or the number of fare distances, that is, the distance a passenger can ride for one

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or more fares, is indicated to the passenger, as also to the conductor. By the same operation the ticket is issued from the machine, and the number of any given fares is counted. It may, however, be desirable in certain cases to dispense with the fare indicator.

I will now refer to the means for setting the station printing rollers whereby the station where a passenger commences and the station at which he terminates his journey may be printed. The stations may be denoted on the machine and on the tickets by any suitable means such as a letter or numeral or the full or abbreviated names of the stations or stages may be denoted. On the upper side of the casing A two similar series of letters or names of stations I^x and K^x are arranged. Assuming a series of letters be employed, the series I^x read in one direction, while the series K^x read in the opposite direction. Let it be supposed that a passenger enters the car at station "A" and wishes to travel to station "C." As the conductor comes along to such passenger, his destination is asked, and upon being informed, the conductor at once takes hold of a knurled head I⁰ at one side of the machine, and also a knurled head K⁰ at the opposite side of the machine. By turning these respective knurled heads, the shafts whereon are mounted the printing rollers carrying the station characters, are rotated so as to bring into printing position any desired station. This position is indicated by pointers i^x and k^x, respectively, which are adapted to point to the stations, inasmuch as the respective shafts i⁰ and k⁰ to which said pointers are attached carry at their inner ends small bevel wheels i³ and k³, respectively, which mesh with bevel wheels i⁴ and k⁴ on the shafts I¹ and K¹ pertaining to the station printing rollers I and K respectively. Thus in the instance given, by bringing the pointer k^x so as to indicate station "C" the corresponding station on the printing roller K will be brought into printing position, while by bringing the pointer i^x so as to indicate station "A" the corresponding station on the printing roller I will be brought into printing position.

The present machine therefore provides for printing the stations from and to which a passenger is going, as also the fare or the number of unit fares upon a ticket, that is to say, if a passenger is going a certain distance for which one fare is charged, then the one-fare set of mechanism is operated, while if the passenger is going a distance requiring two fares, the two-fare set is operated. At the same time, each set operated counts the number of tickets issued, so that, at the end of any given time, the number of one-fare, two-fare or other multiple fare may be ascertained; it being understood that according to the number of classes of fares so there are separate sets of mechanism for issuing the tickets therefor, the several sets operating as described above with reference to the accompanying drawings.

I will now proceed to describe the mechanism whereby the time of day is indicated and printed upon the ticket, a duplicate ticket is stored, also the means whereby the fare indicator must be returned to zero before a fresh ticket can be issued.

The casing A is fitted with a clock P and encloses two or more sets of mechanism arranged in pairs whereof one set of each pair is for issuing while the other is for storing the tickets; the tickets being issued through the opening F². In the drawing the machine is shown as comprising one set of issuing mechanism and one set of storing mechanism. The duplicate sets of mechanism are counterparts and are interconnected in such a manner that the setting of both sets of mechanism is effected simultaneously; thus adapting them to print a duplicate ticket whereof the one series is issued from the machine while the other series is stored therein. The electrotype H^x is represented detached in face view in Fig. 14. Between the slot H¹ and the slot H² is formed a smaller slot H⁴. In this slot projects a unit fare printing wheel Q which prints the number of fare units upon the ticket, such fare printing wheel being turned so that the proper fare will be printed upon the ticket, as will hereinafter appear.

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Between the slots or openings H^2 and H^3 is mounted a clock face H^5 , the hands h and h^1 of which are connected with time operating mechanism, such as a clock P , as will also hereinafter appear. These time characters are also impressed upon the ticket as it is being printed. The method of impressing the ticket being already understood it will suffice here to say that, upon the printing being effected, the ticket from the issuing set of mechanism passes out of the machine, while the ticket pertaining to the storing set of mechanism and which has been simultaneously printed will be stored therein as will hereinafter appear.

Referring again to the printing mechanism, in order that the fare wheel Q in each set may be set to indicate the amount of fare for any given distance, I provide a fare wheel setting shaft Q^1 (see Figs. 12 and 13) which extends out through the casing and carries a knurled head Q^2 thereon. This shaft also carries as many bevel pinions q as there are fare printing wheels Q . These bevel pinions mesh with bevel pinions q^1 carried by the fare printing wheels Q . Thus, when a fare printing wheel is rotated so that the proper fare printing character on its periphery comes into printing position on one wheel, the same character will be in printing position on the fare printing wheel of each set of mechanism. From each fare printing wheel extends a shaft q^2 supported in bearings q^3 and q^4 (see Figs. 12 and 13). On the outer end of the shaft q^2 is mounted a bevel pinion q^5 which meshes with the bevel pinion q^6 carried at one end of an indicator operating shaft q^7 . The opposite end of this shaft also carries a bevel pinion q^8 which meshes with another bevel pinion q^9 carried by an indicator Q^3 , pivotally mounted on a stud Q^4 (see Figs. 12, 17 and 18). This fare indicator Q^3 carries a ratchet wheel Q^5 with which engages a stop device Q^6 . When the stop device is out of engagement with the ratchet wheel, as will hereinafter appear, the fare indicator may be quickly rotated to zero by means of a spring Q^7 , one end of which engages with the fare indicator, while the other end is connected with a stud q^{10} , screwed into a cross bar q^{11} carried by the side plates B . The stop device Q^6 is pivoted on a bar q^{12} pivotally supported upon a stud q^{13} , screwed into one of the guides b^3 . With this bar engages one end of a push rod Q^8 which projects through the casing and has mounted on its outer end a push button Q^9 . As a conductor is about to take up a fare of a passenger, he presses the push button Q^9 , thereby moving the bar q^{12} , together with the stop device or detent Q^6 , away from the ratchet wheel Q^5 . This permits the indicator to instantly rotate to such a position that zero appears through the sight opening N^1 in the casing A , it being understood that such indicator contains, in addition to the character zero, characters from 1 to 10 or more as shown in Fig. 17 if desired, such characters indicating the number of fare units a passenger is required to pay, according to the distance to be travelled. At the same time the push button is operated to release the fare indicator so that it may return to zero, a wedge or cam Q^{10} , loosely mounted on the push rod Q^8 , is forced downward by means of a catch Q^{11} into contact with the adjacent arm of a bell-crank lever Q^{12} . Consequently, when the push button is depressed, the arm of the bell-crank lever is thrown from its full line position to its dotted line position (see Fig. 18). This at once releases a detent constituting the other arm of the bell-crank lever Q^{12} , from engagement with a spur wheel meshing with the rack b^2 . Thus the rack is free to travel upwards and operate the spur wheel M . As the rack nears its upward stroke, a stud or projection b^{15} , carried by the rack, engages with an extension q^{15} from the cam or wedge Q^{10} and acts to elevate such wedge into contact with the catch Q^{11} . This movement of the cam permits the bell-crank lever to resume its normal position, whereby its detent again engages the spur wheel M . As the rack, however, descends, the spur wheel M freely rotates past the detent. As soon as the press button Q^9 is released, a spring Q^{14} acts to return the bar q^{12} to the position indicated in Fig. 18, thereby throwing the detent Q^6 into engagement with the ratchet Q^5 on the indicator, and also returning the push button Q^9 to its normal up-position, ready for the next operation. The stop device Q^6 is pivoted, as shown, and

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yields to permit the indicator to be set for any desired fare, yet at the same time it prevents the indicator from turning, after once being set back to zero, without operating the bar q^{12} as also the stop device away from the ratchet. A spring Q^{6x} serves to retain the stop in the path of the ratchet Q^5 . The pinion m^3 being in connection with the gear wheel M^0 , the feed rollers M^2 , M^3 are, owing to the ratchet connection between the gears M and M^0 only operated during the descent of the racks, the gear M^0 remaining at rest when the racks are ascending. Thus the racks are locked from movement until after the fare indicator has been released, so that it turns to zero every time before another ticket can be issued. This prevents the possibility of the conductor issuing another ticket for the same fare for which the previous ticket was issued, as both the fare indicator and the fare printing wheel simultaneously return to zero. Therefore, in order that the proper fare may be indicated on the second ticket, the conductor must operate the shaft Q^1 by means of the knurled head Q^2 . This knurled head carries a pointer adapted to indicate on a scale Q^{15} the fare in printing and indicating position. It will be understood that by employing the arrangement described in connection with the fare indicator Q^3 it will be only necessary to employ one such indicator for any number of printing and issuing or printing issuing and duplicating mechanisms; the shaft whereby the several fare printing cylinders are adjusted simultaneously effecting the setting of the fare indicator.

It will be apparent that the setting of the fare printing wheel to print any particular fare effects simultaneously the setting of the fare indicator, and that by properly arranging the numbers on the fare indicator, the numbers on the fare printing wheel will correspond. Consequently, whenever a ticket is being printed with any particular fare, such fare is also indicated to the passenger through the sight opening N^1 in the casing A . It should, however, be borne in mind that under certain conditions of working, the indicator or indicators may be dispensed with.

Between the duplicate sets of mechanism (Fig. 16) is mounted the clock P , which carries a central stud or post p having a gear wheel p^1 mounted thereon meshing with a gear wheel p^2 carried by a shaft p^3 , which extends into each set of mechanism, as indicated in Fig. 16. Should, however, more than two sets of mechanism be employed, such shaft would be similarly extended therethrough. Upon the shaft p^3 is mounted a bevel pinion p^4 same meshing with the bevel pinion p^5 pertaining to the minute shafts p^6 . The shaft p^6 pertaining to each set of mechanism carries at its lower end a 'hand' or printing character h , and near its lower end a gear wheel p^7 (see Fig. 12), which engages with a gear wheel p^8 supported by a bracket p^9 . Immediately beneath the gear wheel p^8 is a smaller gear wheel p^{10} ; the latter meshing with the gear wheel p^{11} on the hollow hour shaft p^{12} which carries the hour printing hand h^1 and through which the minute shaft p^6 passes. Should there be more than two sets of mechanism, the time mechanism of each set is connected with the shaft p^3 in a similar manner.

From the above it will be understood that in each set is mounted a roll of paper in strip form which is adapted to receive impressions from printing characters, such printing characters indicating the traveller's trip, viz., the station from which he came and that to which he is going, the date and the time when such ticket was issued, together with other suitable matter, and the amount of the fare. Other characters than those given as an example may however be employed for printing and indicating the fare.

Referring to the set of mechanism for storing the duplicate ticket, (Figs. 15 and 16 particularly,) it will be seen that it comprises a shaft r which carries the storage roller R . This shaft projects through one of the side plates and has mounted thereon the fixed member r^1 of a clutch, as also a pinion r^2 . The outer end of the shaft is screw-threaded for the reception of a knurled nut R^1 : a spring r^3 being interposed between the pinion r^2 and the said nut. By screwing

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the nut R^1 more or less on the shaft and compressing the spring r^3 the moveable member r^4 of the clutch is forced into contact with the fixed member r^1 ; it being understood that the member r^4 is loose upon the shaft r . Upon the shaft D^3 is a gear wheel r^5 which meshes with an idler r^6 carried by the stud r^7 ; the idler r^6 meshing with and operating the pinion r^2 , and thereby actuating the member r^4 of the clutch, it being understood that the clutch and gear are connected either integrally or otherwise. The above arrangement entirely obviates any tendency on the part of the roller R to wind the paper faster than it is drawn from the roller F^0 by means of the rollers M^2 M^3 and which would result in putting considerable strain on the paper and cause the fracture of the strip. With the aid of the present device the tension may be so adjusted that when the pull upon the paper strips becomes excessive there will be more or less strip between the moveable and fixed members of the clutch.

The method of operating the bell and the fare counting device illustrated in connection with the issuing and storing mechanism (Figs. 12 and 17) will be readily understood upon reference to the description relative to Figs. 3, 4, 5 and 6.

For printing upon the ticket the serial number indicated by the counter O^2 , I arrange the printing-cylinder pertaining to the stations side by side, so that the station indicators, or the names of the stations, as the case may be, when printed upon the ticket appear side by side instead of the one appearing in a space situate towards the upper end of the ticket and the other in a space situate towards the lower end of the ticket as hereinbefore described; the serial number occupying the latter space as will be seen on reference to Fig. 27.

Several examples of means for accomplishing the above objects are illustrated in Figs. 20 to 26, the aim being to ensure the operation of the two counters simultaneously and positively with the lever D^6 . Referring to Fig. 20, the operating lever D^6 is formed with a cam-slot d wherein engages a pin d^0 which projects laterally from a link d^1 ; the latter connecting the levers O^1 O^{1x} respectively pertaining to the indicating-counter O^2 and printing counter O^{2x} . The counters may, however, be operated the one from the other by means of spur gearing as shown in Fig. 21 wherein d is the slot in the operating lever, d^1 the link and d^2 an intermediate toothed pinion for communicating the motion from the pinion d^3 pertaining to the indicating counter to the pinion d^4 pertaining to the printing counter. The pinions d^3 and d^4 may be operated directly by means of a forked link d^{1x} as shown in Fig. 21^a; the intermediate wheel d^2 being dispensed with. According to another arrangement, Fig. 22, the indicating counter is rotated by means of a detent d^5 on one end of a pivoted arm d^6 such motion being communicated to the printing counter by another detent d^7 at the opposite extremity of the pivoted arm. The detents engage with ratchet wheels d^{5x} and d^{7x} pertaining to the indicating and printing counters respectively. If desired the counters may be arranged immediately above one another instead of laterally side by side as shown in Figs. 23 and 24. Moreover, instead of forming the slot d in the lever D^6 it may be formed in the link d^1 .

Fig. 26 illustrates a mode of operating or setting the station printing cylinders when arranged for printing the stations side by side. The several printing cylinders I are mounted loosely upon the shaft K^{1x} while the several cylinders K are rigidly secured thereto. The outer end of the shaft K^{1x} is furnished with a head K^{0x} whereby same may be turned so as to bring the cylinder K into proper printing position. The turning the cylinders I into proper printing position is effected by means of the head I^{0x} on the shaft I^{1x} ; spur gearing i^{1x} communicating the rotative motion of the shaft I^{1x} to the several cylinders I . Instead of employing the indicators i^x and k^x the periphery of each turning head I^{0x} , K^{0x} may be provided with the several station indicators; same being coincident with the stations on the periphery of the respective printing cylinders. The printing position of any one of the indicators may be rendered ascertainable by means of a pointer or suitable mark on the casing A .

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In some instances it may be found desirable to fit these machines in the vehicle or other locality where the machine is required for use, and in order that the machine may be operated from a distance, I provide a number of tubular shafts S S supported by brackets s s. There are as many shafts S as there are sets of printing and issuing mechanism the one shaft working within the next enclosing shaft. The operation of the several sets of mechanism will be understood if the operation of one is described. The shaft S is connected with a two-armed lever S¹, this lever being connected with another two-armed lever S² by means of rods s¹, s¹. The lever S² is secured on the spindle D^{7x} whereon the segment D^{5x} is mounted. Thus the printing and issuing mechanism is operated from the tubular shaft. For operating the shaft at a distance a handle S³ projecting from the shaft S and bearing a numeral indicating the fare printing and issuing mechanism to which it pertains is employed. Upon turning the handle down and then up the machine is operated in the same manner as by the handle D⁶. It will be understood that each shaft S is provided with a lever S¹ and a handle S³; the several shafts (excepting the innermost one) being slotted to permit the several handles pertaining thereto making the required movement.

By numbering or otherwise marking each machine and applying such mark to the electrotype a ready means of identifying tickets with a particular vehicle or conductor may be provided.

Although, for the purpose of exemplification, a machine applicable for use on road-cars has been taken, it will be obvious that the apparatus may be adapted for use in the production of tickets or checks appropriate for other services.

For example, should the machine be required for issuing bills for goods purchased in a shop or other vending establishment, the printing cylinders pertaining to the stations or stages in the journey would be replaced by cylinders bearing a reference to the nature of the goods. The means for setting these cylinders would require modifying seeing that both the "to" and the "from" cylinders would not be required. Several cylinders may, however, be arranged side by side, each containing descriptions of the goods. Numeral wheels for printing the amounts of the purchase will be substituted for the fare printing wheels, and so on, such other alterations being made as occasion may require.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I claim:—

1. For use in printing and issuing tickets and the like, the herein described means whereby a ticket is furnished bearing certain particulars which vary in character as between one ticket and another and certain other matter which is constant in character, while the amount of each individual fare or value of the purchase or consideration is indicated or exhibited to the passenger or purchaser and at the same time the ticket is counted by numerating mechanism.

2. For use in printing and issuing tickets and the like, the herein described means for printing and issuing tickets bearing certain particulars of a character which varies as between one ticket and another and certain other matter which is constant in character and for printing or storing or recording duplicates of all tickets issued.

3. For use in printing and issuing tickets, bills and other checks, the improved means constructed or operating substantially as herein described, and whereby tickets, each representing a different fare and bearing certain particulars of a character which varies as between one ticket and another and certain other matter which is constant in character, may be printed and issued, and the amount of the fare, purchase or consideration printed, indicated and the ticket counted; the tickets pertaining to each fare being produced by printing and issuing and indicating and counting mechanism corresponding with the several fares comprised in the machine.

4. In a ticket printing and issuing machine, the herein described means for

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run of the vehicle, or an abbreviation thereof or a distinctive sign therefor or the particulars of the articles purchased or other consideration.

5 5. In a ticket printing and issuing machine, the combination of means for printing the commencing and terminating stations of the trip or other matter which varies in character and means for setting such printing mechanism, substantially as herein described.

6. In a ticket printing and issuing machine, the improved means for printing the date and for setting the date printing mechanism, substantially as herein described.

10 7. In a ticket printing and issuing machine, indicating the time at which a ticket, bill or other check is issued and printing the same thereon substantially as herein described.

15 8. In a ticket printing and issuing machine, the combination, with an electro-type bearing certain matter which is constant in character, of printing wheels or cylinders bearing particulars which vary as between one ticket, bill or other check and another, such as the names of the stations and the date, substantially as herein described.

20 9. In a ticket printing and issuing machine, the combination, with an electro-type bearing certain matter which is constant in character and a dial in connection with time- or clock-mechanism, of wheels or cylinders adapted to print particulars which vary as between one ticket and another, such as the stations, the date, or the like, substantially as herein described.

10. In a ticket printing and issuing machine, the herein described means for inking the printing characters and for impressing the paper strip therewith.

25 11. In a ticket printing and issuing machine, the improved means for simultaneously operating the inking and printing mechanism and the device for feeding a paper strip and ejecting or issuing the printed portion of said strip, substantially as herein described.

30 12. In a ticket printing and issuing machine, providing means for identifying tickets with a particular machine and with the conductor or place where such machine is in use, substantially as herein described.

13. In a ticket printing and issuing machine, providing means for counting and for indicating on the face of the machine the serial number of the tickets printed and issued, substantially as herein described.

35 14. In a ticket printing and issuing machine, simultaneously operating the inking and printing mechanism, the device for feeding a paper strip and ejecting or issuing the printed portion of said strip, and mechanism for counting and indicating the number of tickets or other checks issued, substantially as herein described.

40 15. In a machine for printing and issuing tickets, bills or other checks of various denominations, the employment of several sets of mechanism, substantially as herein described, and whereby the setting of the matter which varies as between one ticket and another may be effected simultaneously through the several sets of mechanism while each of the sets is capable of separate manipulation and of issuing its own particular ticket whereof the serial number is indicated to the passenger.

45 16. In a ticket printing and issuing machine, the employment of duplicate sets of mechanism whereof one set operates to print and issue tickets or other checks while the other set is simultaneously operated to print and store duplicates of such tickets or other checks, substantially as herein described.

50 17. In a ticket printing and issuing machine, the employment of time or clock mechanism in conjunction with mechanism for simultaneously printing and issuing or for printing, issuing and storing tickets, bills or other checks, substantially as herein described.

55 18. In a ticket printing and issuing machine, an indicator for the amount of the fare purchase or other consideration, substantially as herein described, in

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conjunction or not with the means for operating same whereby its return to zero must be effected prior to the printing and issuing of a ticket.

19. In a ticket printing and issuing machine, the employment of indicators for the amount of the fare, purchase, or other consideration, and of means for setting or otherwise manoeuvring the same simultaneously with their corresponding printing wheels or cylinders, substantially as herein described. 5

20. In a ticket printing and issuing machine, the employment of printing characters, inking and impressing rollers and means for operating and guiding the same and paper feeding and delivering rollers in conjunction or not with a storage roller, all arranged or operating substantially as herein described. 10

21. In a ticket printing and issuing machine, providing means for printing the serial number upon the ticket, substantially as herein described.

22. In a ticket printing and issuing machine, providing means for printing the commencing and terminating stations side by side, substantially as set forth.

23. In a street car or similar vehicle, or in any other locality, mounting a series of printing and issuing machines of the character herein described, and whereby tickets, bills or other checks may be printed and issued, substantially as herein described. 15

24. Apparatus for use in printing and issuing tickets, bills, or other checks, constructed or operating substantially as described with reference to the accompanying drawings. 20

Dated this 23rd day of February, 1901.

For the Applicant,

G. G. M. HARDINGHAM,

Chartered Patent Agent.

Clun House, Surrey Street, London, W.C. 20

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1902.



Fig. 3.

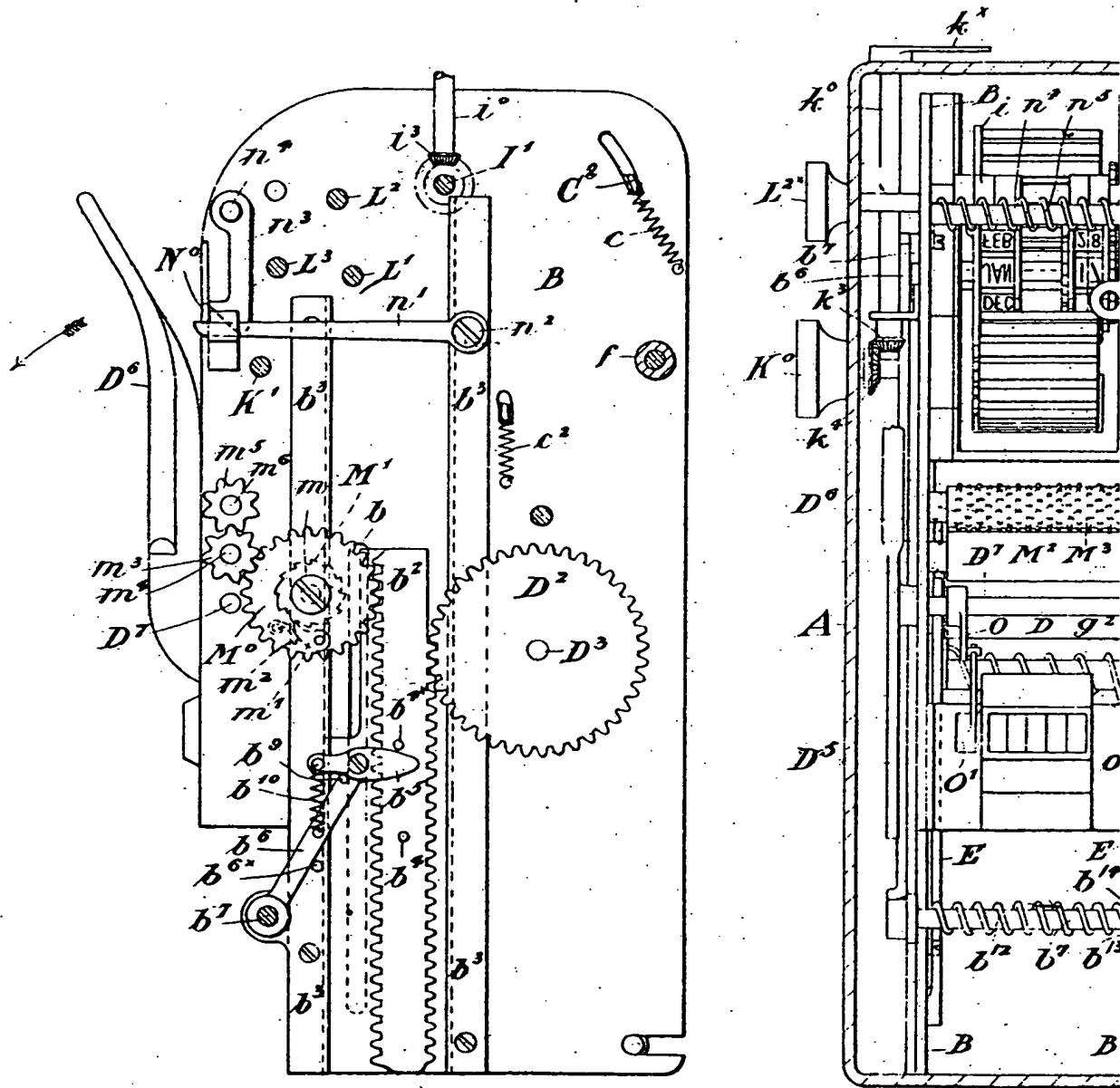
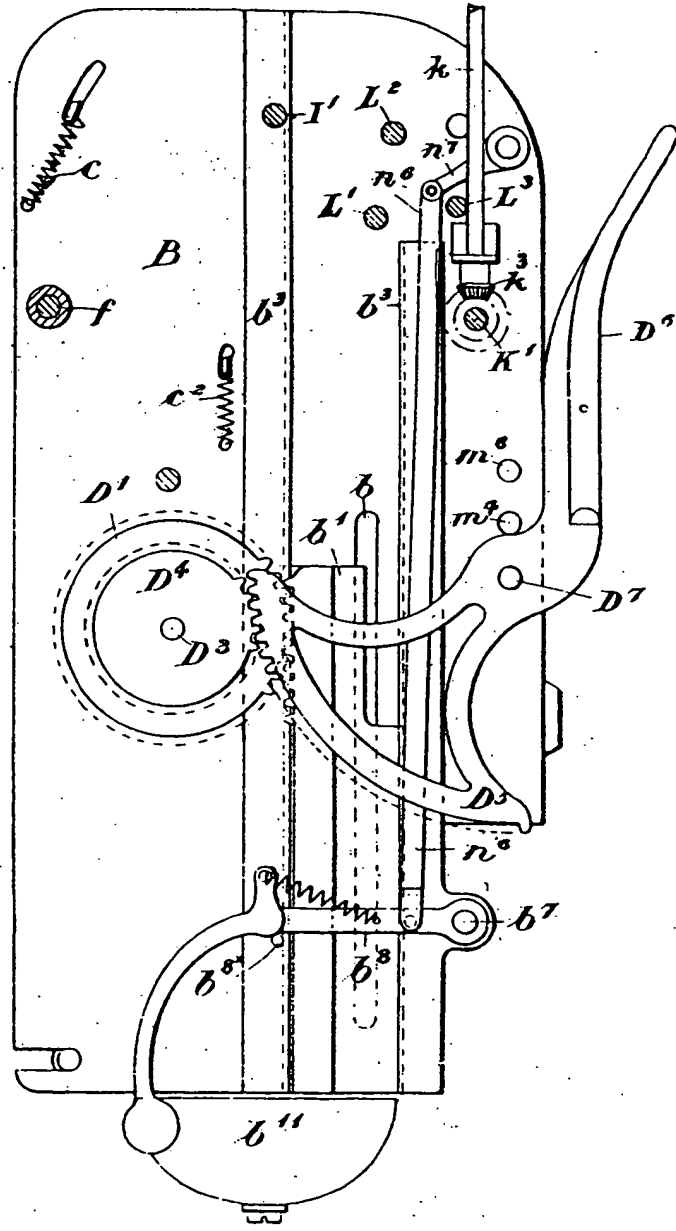
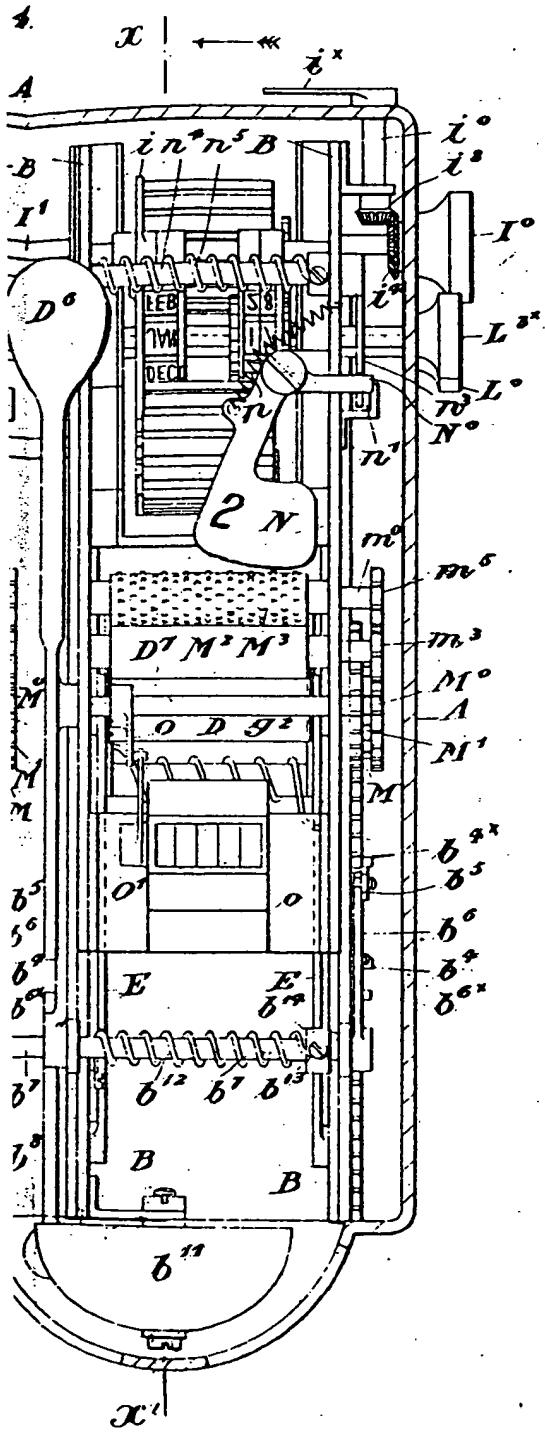


Fig. 5.



Invention of the Applicant
 Filed for Patent in the United States
 August 10, 1900
 By *[Signature]*
 Attorney at Law

Fig. 8.

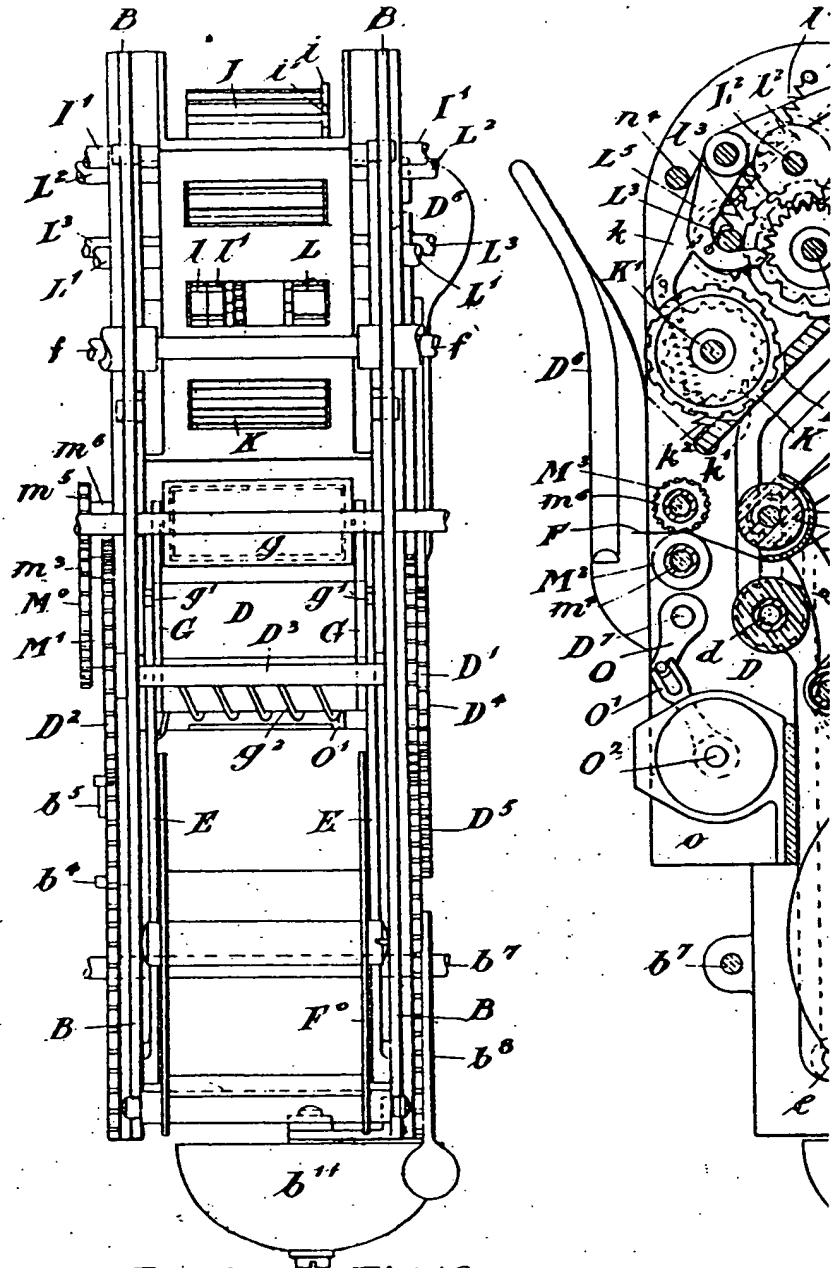
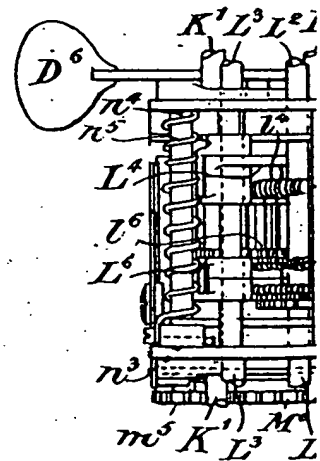
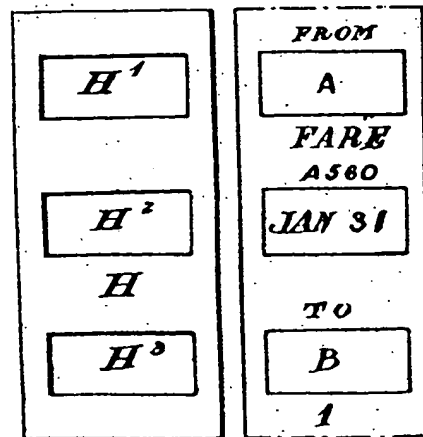


Fig. 9.

Fig. 10.



6.

Fig. 15.

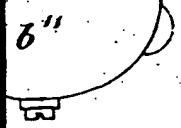
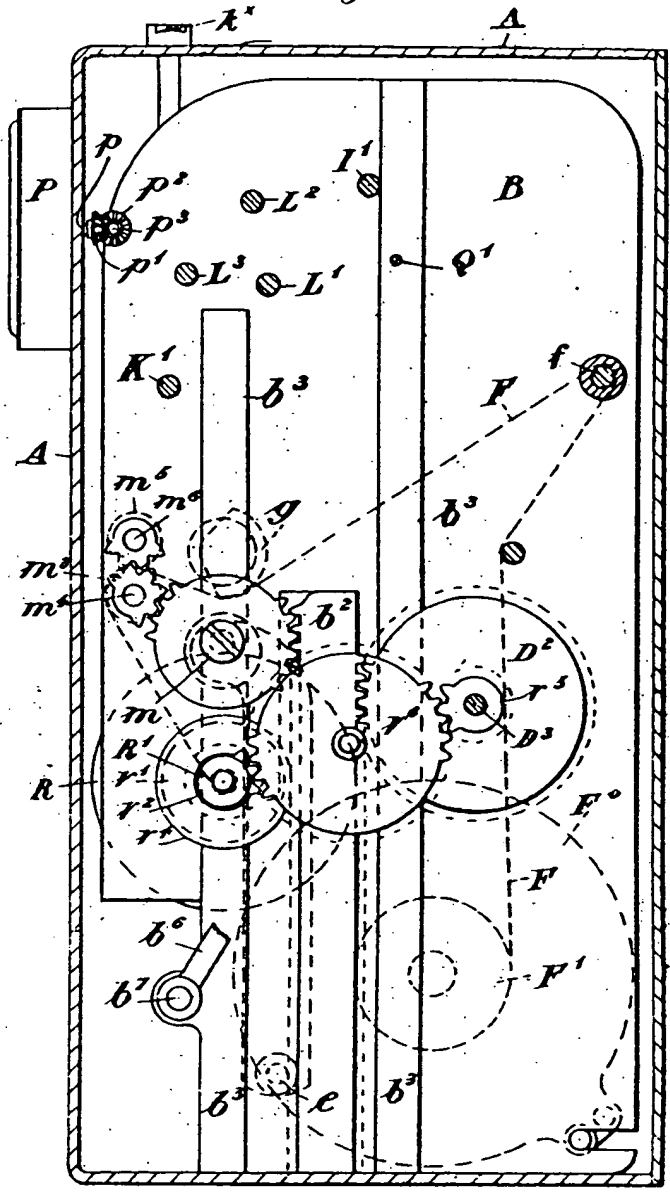
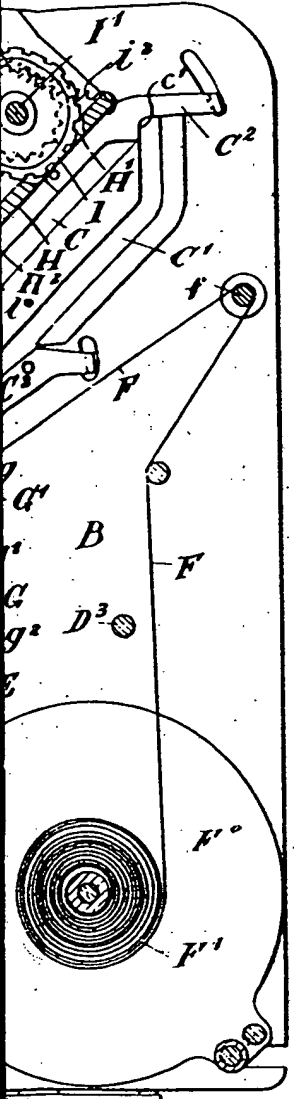
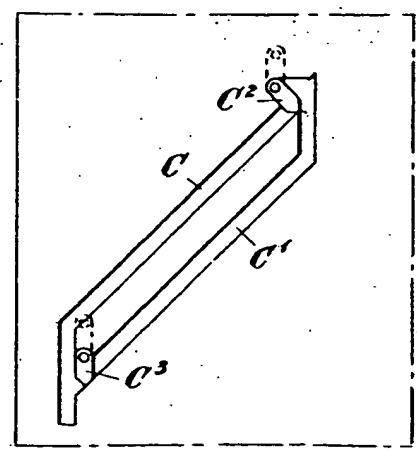
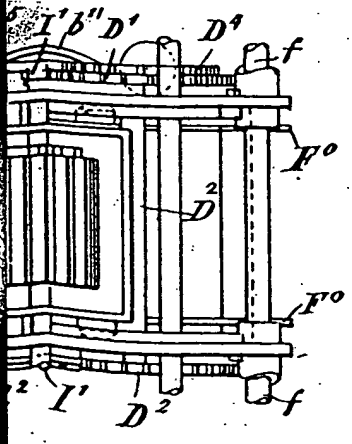


Fig. 11.

Fig. 7.



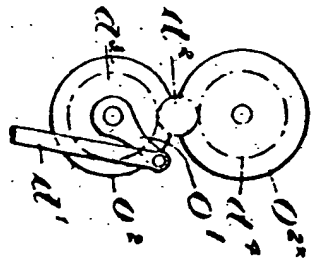


Fig. 23.

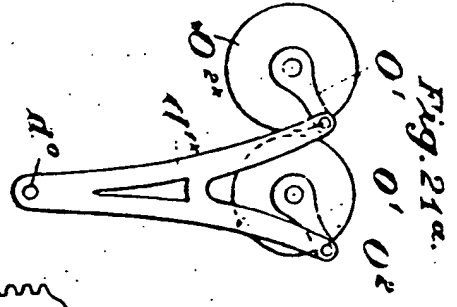


Fig. 21a.

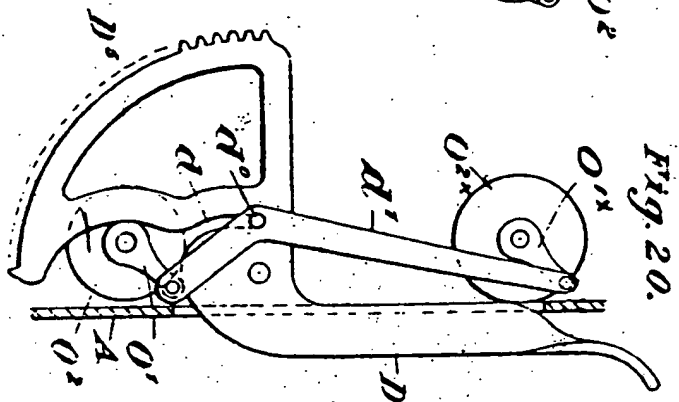


Fig. 20.

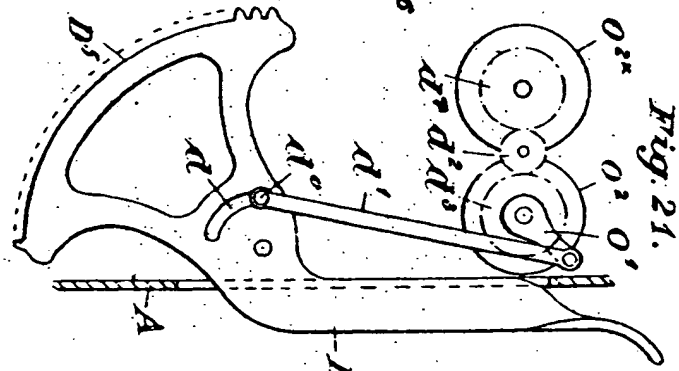


Fig. 21.

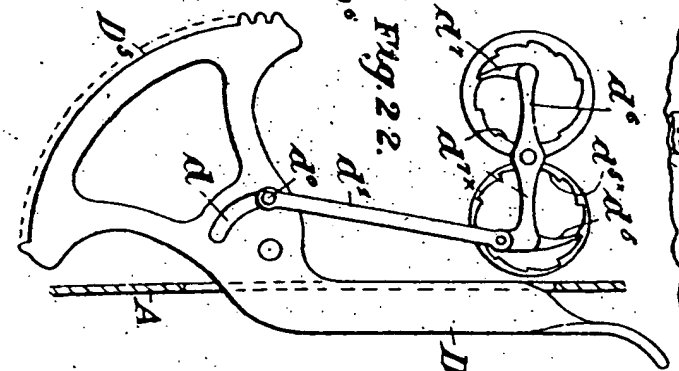


Fig. 22.

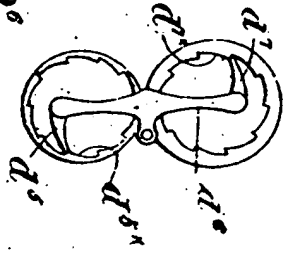


Fig. 24.

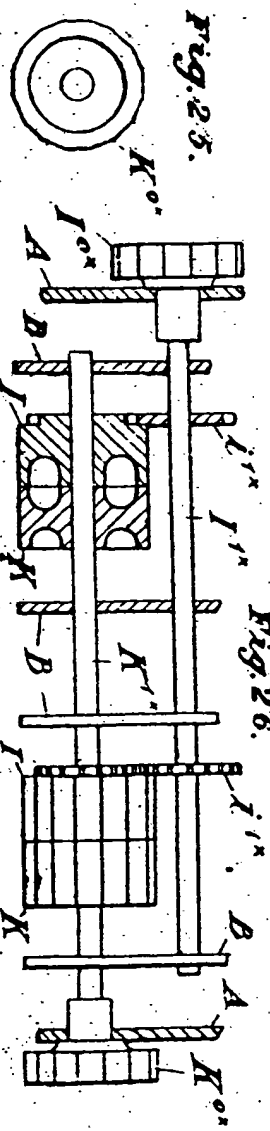


Fig. 25.

Fig. 26.

Fig. 27.

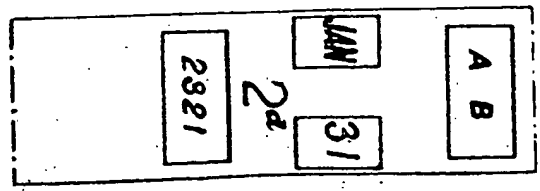


Fig. 12.

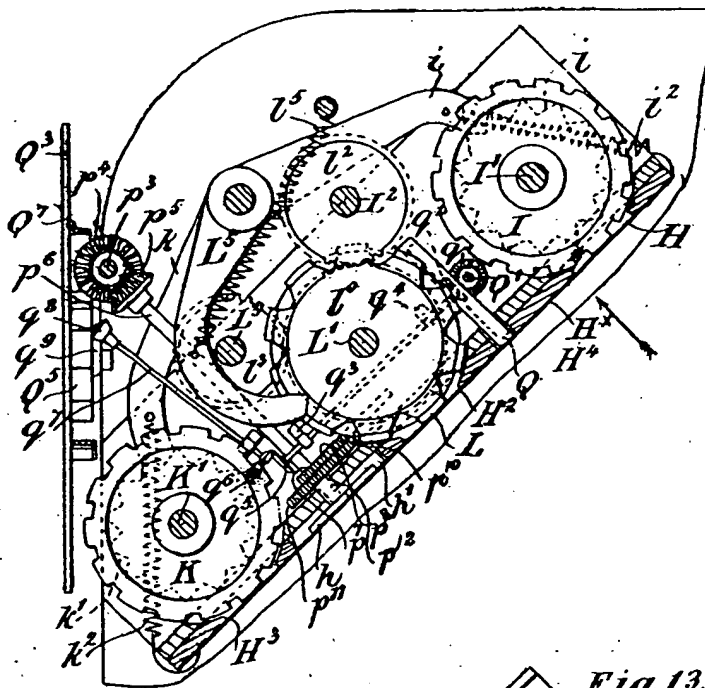


Fig. 13.

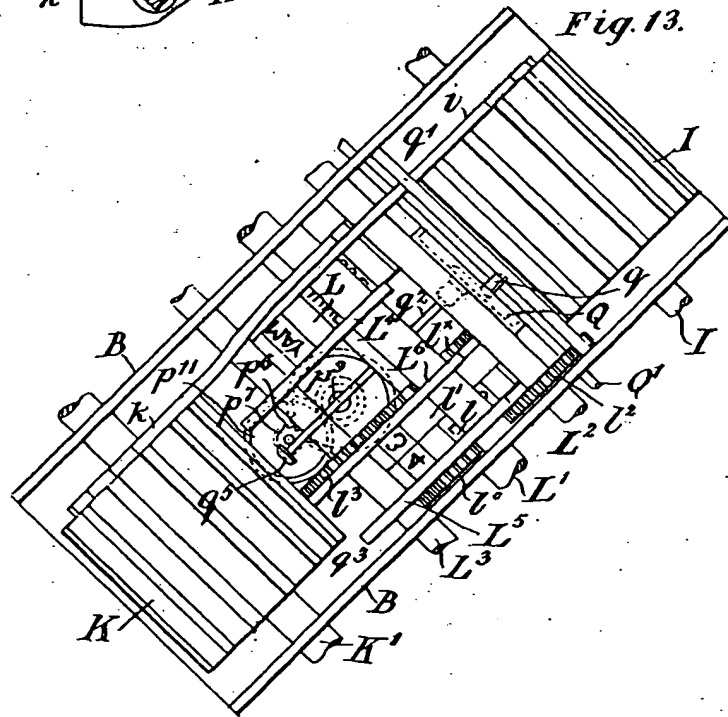
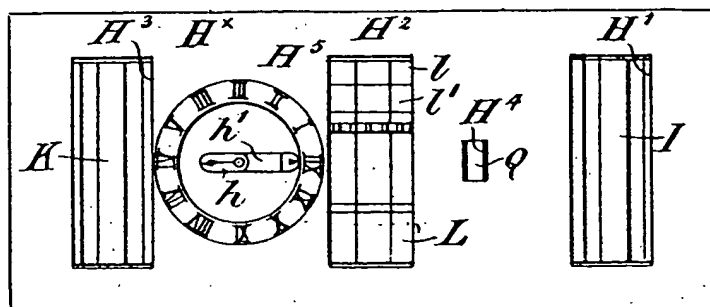
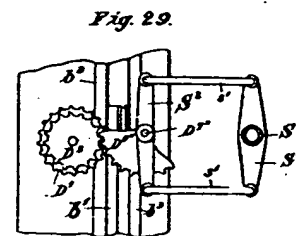
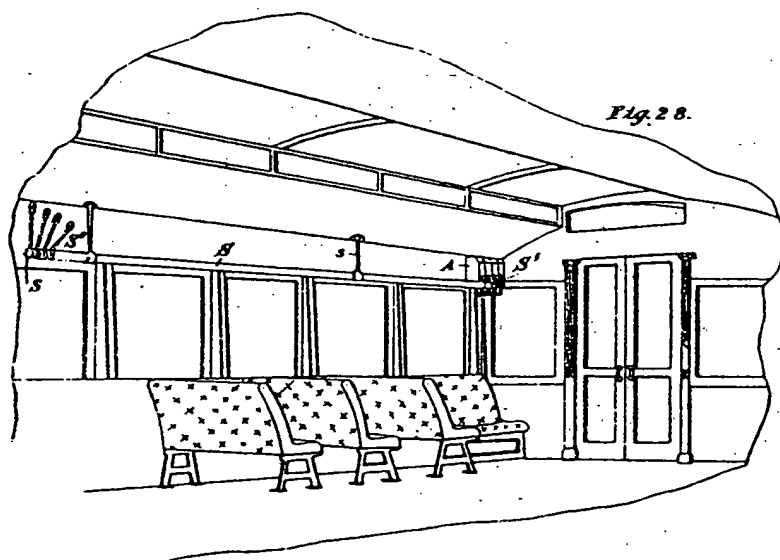


Fig. 14.



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